MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2 2016/2017

TSE3151/TSD2711 – SOFTWARE DESIGN

(All Sections/Groups)

01 March 2017
09:00 AM – 11:00 AM
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. The total number of pages for this examination paper is ten(10) pages including the cover page.

2. This examination paper contains a total of six(6) questions divided into two(2) different sections, Section A and Section B, respectively. Each section contains three(3) questions.

3. You are required to answer a total of four(4) questions. You must answer any two(2) questions from Section A, and any two(2) questions from Section B.

4. Each question carries an equal score of 20 points. The total score for this examination paper is 80 points.

SECTION A

(Answer any two(2) questions in this section)

QUESTION A1

A1(a) Describe the design focus of the following software systems. You may provide examples in your answers.

(a1) Platform-based systems

(a2) Event-based systems

(a3) Distributed-based systems

(a4) Concurrent-based systems

(a5) Information-based systems

[5 x 2 points = 10 points]

A1(b) Answer the following questions. You may provide examples in your answers.

(b1) State two(2) differences between functional and non-functional requirements in the context of how each affects software designed.

[2 points]

(b2) Describe the sources of three(3) inputs for software design. The sources mean where these inputs originated.

[3 points]

(b3) State one(1) important negative impact for incomplete software requirements.

[2 points]

(b4) Describe the meaning of the three(3) terms: explicit requirement, implicit requirement and emergent requirement.

[3 points]

Continue ...

QUESTION A2

A2(a) Describe how the following concepts and principles in object-oriented design overcome the weaknesses of structured, imperative and procedural design.

(a1) Classes and objects

(a2) Abstraction

(a3) Inheritance

(a4) Encapsulation

(a5) Polymorphism

[5 x 2 points = 10 points]

A2(b) Answer the following questions. You may provide examples in your answers.

(b1) Describe the focus of the "Single Responsibility Principle" and the "Open-Closed Principle" in object-oriented design.

[2 points]

(b2) Describe why the goal in object-oriented design is to have classes that are low in coupling and high in cohesion.

[2 points]

(b3) Discuss the types of systems where the "Data-Centric" architecture and the "Service-Oriented" architecture are suitable candidates for their designs.

[2 points]

(b4) The "Peer-to-Peer" software architecture is considered as network-centric. Describe why it is considered so.

[2 points]

(b5) Multi-threading and Multi-processing are two different methods used in the implementation of parallel processing. Discuss one(1) difference between the two methods.

[2 points]

Continue ...

QUESTION A3

A3(a) Discuss the following design qualities for software systems in terms of achieving their design targets. You may provide examples in your answers.

(a1) Design for Modularity

(a2) Design for Fault-tolerance

(a3) Design for Maintainability

(a4) Design for Reusability

(a5) Design for Platform compatibility

[5 x 2 points = 10points]

A3(b) Answer the following questions. You may provide examples in your answers.

(b1) Explain what is meant by the following statement: "*In procedural design, the logic is linear while in object-oriented design, the logic is nonlinear*".

[2 points]

(b2) Consider this statement: "*Use-cases in software design are about what users will be doing with the system*". This statement is partially correct. Explain.

[2 points]

(b3) "*State machine diagrams are used to describe the structural properties of finite state machines*". This statement is incorrect. Discuss.

[2 points]

(b4) Discuss why words that are of type "*verb*" in requirement documents are possible candidates for class methods in object-oriented design.

[2 points]

(b5) In object-oriented design, when would you implement the "Composite Class" design over the "Class" design?

[2 points]

Continue ...

SECTION B

(Answer any two(2) questions in this section)

QUESTION B1

B1(a) Describe the following software systems in terms of their design implementations. You may provide examples in your answers.

(a1) Loadable Kernel Modules (LKM) system

(a2) Rule-based systems

(a3) Pure Interpreter systems

(a4) Transaction Processing systems

(a5) Cloud Computing systems

[5 x 2 points = 10 points]

B1(b) Answer the following questions. You may provide examples in your answers.

(b1) Apache Cassandra is a database that is considered a distributed architecture database. Describe two(2) features of this distributed database.

[2 points]

(b2) Apache Hadoop is considered a distributed file storage system. Describe how parallel and distributed processing are conducted on the Hadoop infrastructure.

[2 points]

Continue ...

B1(c) You are provided with the following design diagram.

Write in plain English and in complete sentences, your interpretation of the specifications shown in the diagram below.

[6 points]

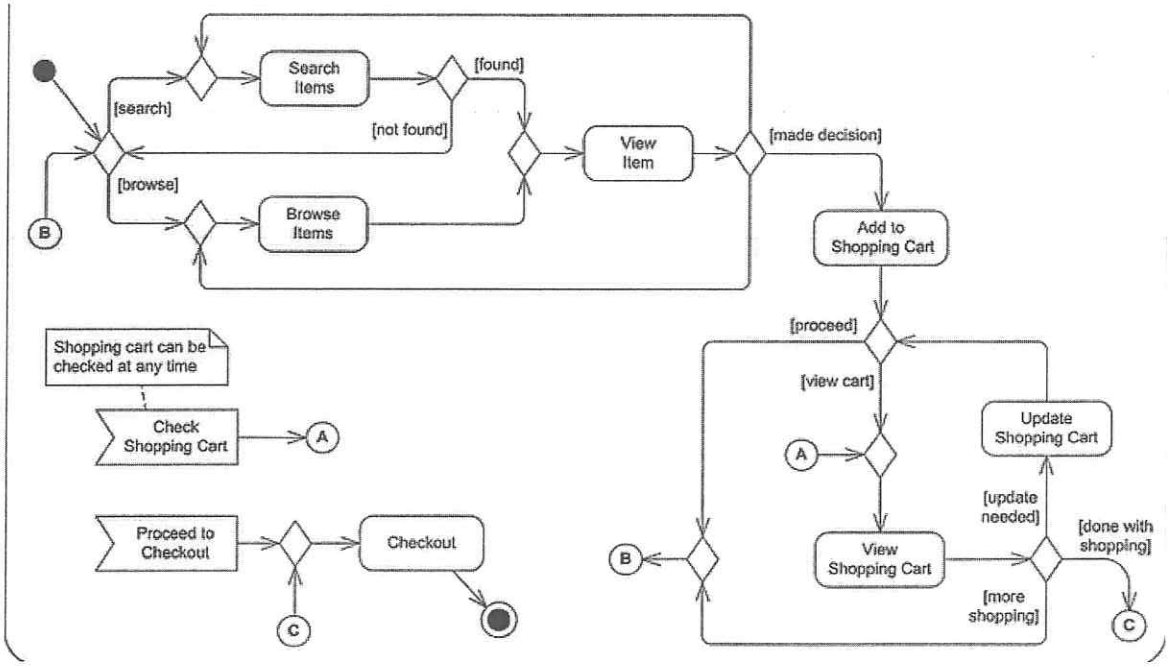

Fig 1 Design Diagram for Question B1(c)

Continue ...

QUESTION B2

B2(a) Answer the following questions. You may provide examples in your answers.

(a1) Describe the focus of four(4) categories of software design patterns.

[4 points]

(a2) "*It is considered sensible to implement software systems using design frameworks.*" Discuss this statement.

[2 points]

(a3) In algorithm design, explain the situations where we should use the

while(expression) ... loop and the
do .. until(expression) loop.

[2 points]

(a4) Describe the purpose of the "thread-pool" design pattern as it is implemented in a web server application.

[2 points]

(a5) "*Conditional expression and conditional branching are related terms.*" Explain this statement.

[2 points]

(a6) State two(2) differences between sequential and parallel designs of software applications.

[2 points]

Continue ...

B2(b) You are provided with the following design diagram.

Write in plain English and in complete sentences, your interpretation of the specifications shown in the diagram below.

[6 points]

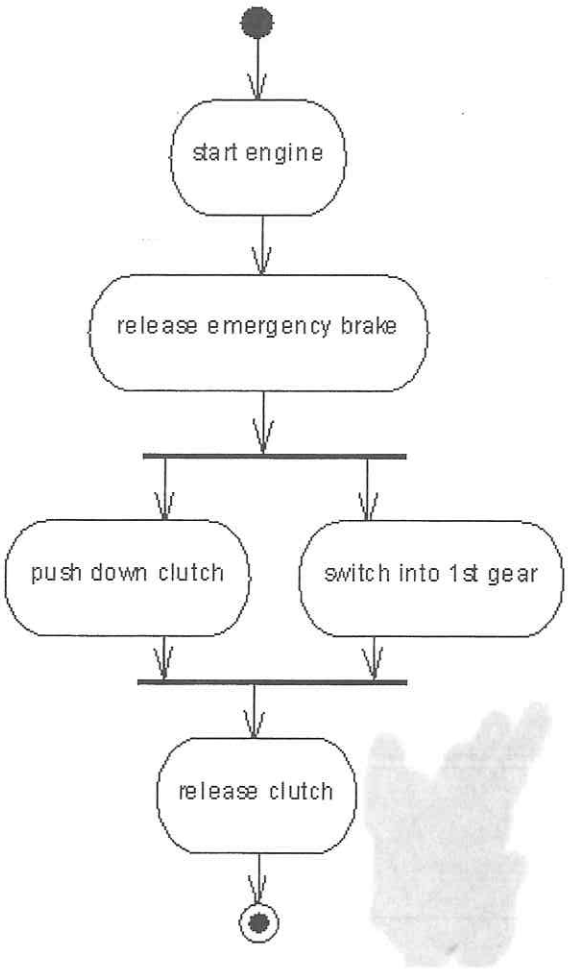

Fig 2 Design Diagram for Question B2(b)

Continue ...

QUESTION B3

B3(a) Answer the following questions. You may provide examples in your answers.

(a1) Provide an example of the steps you will undertake to provide a user interface (UI) design that discloses information in a progressive fashion.

[4 points]

(a2) Describe two(2) challenges on the hosting of applications and data in the clouds.

[2 points]

(a3) Describe two(2) challenges on the Internet of Things (IoT).

[2 points]

(a4) What is Big Data? How is Big Data generated?

[2 points]

(a5) Discuss two(2) design issues when interfacing hardware on specific platform based systems.

[2 points]

(a6) Why is a software design pattern not considered a finished design?

[2 points]

Continue ...

B3(b) You are provided with a UML Use-Case Scenario for a bank ATM machine below.

Write in plain and complete English sentences, the requirement specifications extracted from this diagram.

[6 points]

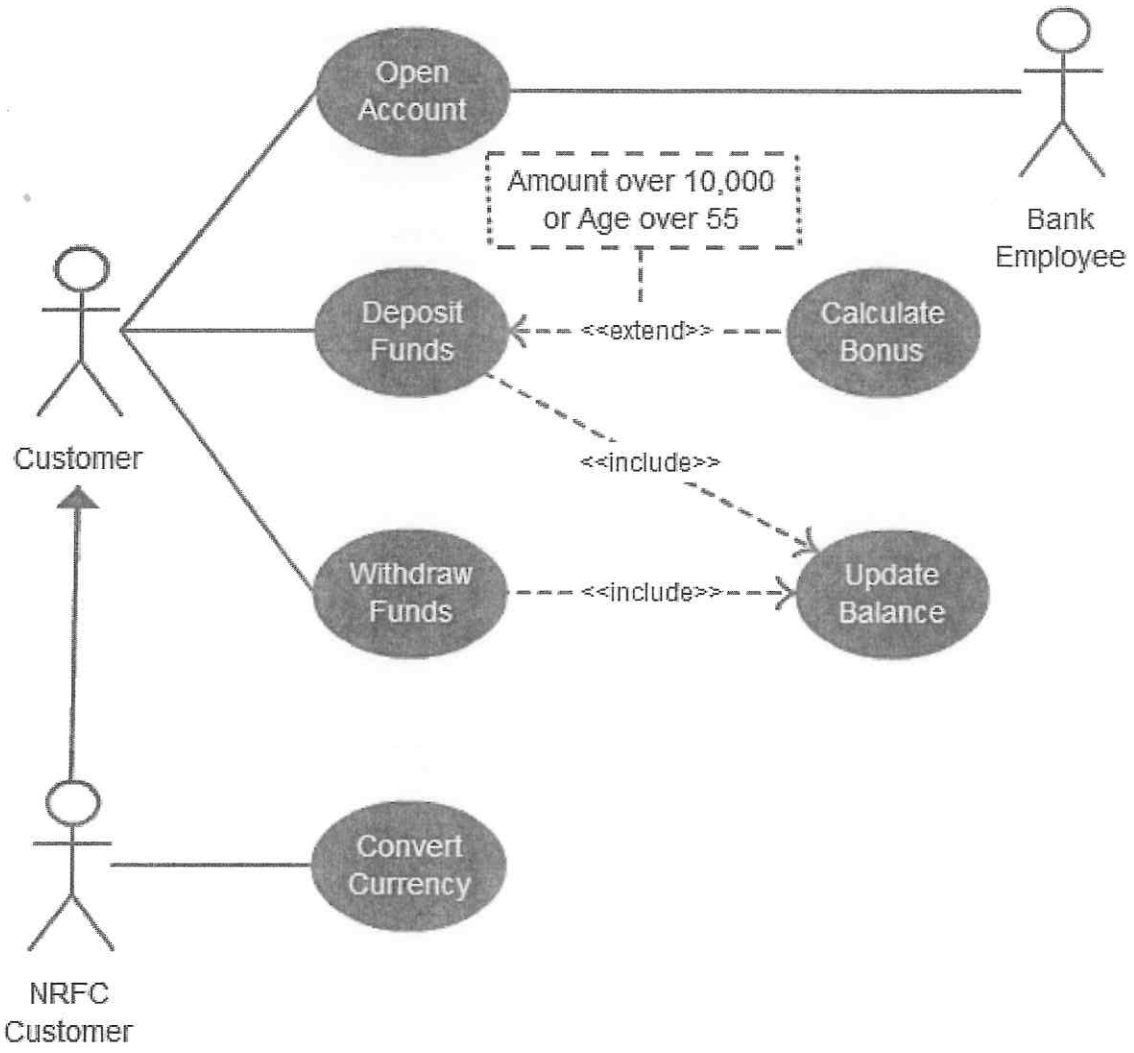

Fig 3 Design Diagram for Question B3(b)

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